UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/691,763	10/23/2003	Scott J. Clifford	16129	6713

50659 7590 01/11/2007

BUTZEL LONG
STONERIDGE WEST
41000 WOODWARD AVENUE
BLOOMFIELD HILLS, MI 48304

EXAMINER	
KOCH, GEORGE R	
ART UNIT	PAPER NUMBER
1734	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/11/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/691,763	CLIFFORD ET AL.	
	Examiner	Art Unit	
	George R. Koch III	1734	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 October 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *61-101* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *61-101* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 61, 63, 65, 67, 69-73, 77, 79-82, 86, 87, 89-92, 94-95, and 98-101 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeo (US Patent 4,721,630) in view of Yamamoto (US Patent 5,240,745) and either or both of Nuber (DE 101 19 906 A1) and/or Pearce (US 4,781,517)

As to claim 72, Takeo discloses a modular apparatus for performing a process on an object having an upper surface and sides conveyed to and from a location, comprising a pair of frame rails (items 11, see Figure 1) extending on opposite sides of a location and generally parallel to a path of conveyance of an object through the location, at least one robot arm (items 5_1 and 5_2) mounted on an associated on of each of the frame rail, and a tool mounted on each of said at least one robot arms for performing a process on the object whereby the at least one robot arms move the tools relative to the object enabling the tools to perform processes on the objects. The robot arms are movable along the frame rail and pivotable at a shoulder axis.

Takeo does not discloses that there are at least two legs attached to each of the frame rails for supporting the frame rails above a plane of an upper surface of the object

at the location, and at least one cross support member fixedly connecting the frame rails together to from a rigid structure with legs.

Yamamoto (especially with reference to Figure 15) discloses that it is known to elevate painting robots by placing them on cross support members (item 572) on elevated frame rails (item 518) mounted on legs (items 94a(b), 94c(d), and 38 - best seen in Figure 16). The cross support member connects the frame rails, forming a rigid structure with legs. One in the art would appreciate that elevated positioning would enable better coating of the roof of the car body, while still maintaining the capability of coating the sides of the car body. However, Yamamoto does not place the robots on the frame rails.

Both Pearce and Nuber disclose the concept of elevating a robot on frames, and placing a large portion of the robot underneath the frame.

Pearce discloses a modular apparatus with robots being extendable below the frame rails for performing a process on an object conveyed to and from a location comprising a pair of frame members (*see Figure 2, which discloses a fixed frame and a single robot attached to the two fixed frames*) extending on opposite sides of a location and general parallel to a path of conveyance of an object through the location, at least two legs (items 13, 18, 19 and 20 in Figure 2) attached to each of the frame rails for elevating the frame rails above a plane of an upper surface of the object at the location, at least one cross support member (item 23 in Figures 2) connecting the frame members together to form a rigid frame structure with the legs, at least one robot arm (items 71 and 114) mounted on an associated one of the frame members, and a tool

mounted on the at least one robot arms for performing a process on the object whereby the at least one robot arms move the tools relative to the object enabling the tools to perform processes on the object. Pearce discloses, as shown in figure 2, that both frame rails are fixed as claimed.

Similarly, Nuber discloses a frame or modular apparatus. Nuber's robot is specifically a paint spraying robot (item 13 is called a farbspritzroboter is German for paint spray robot, and item 14 is called a farbspritzpistole, which is German for paint spray gun). The robot includes a fixed frame rail (which defines auxiliary axis 15, and along which the robot 14 moves) and fixed cross beams (rack 12). Additionally, the robot is a six-axis robot (column 3, lines 14-15 discloses that the robot 13 has "sechs aschen", german for six axis), and Figure 3 shows that the robot has a shoulder, elbow, and wrist below the auxiliary axis and the racks. From the position of the joints in Figure 3, both the shoulder and elbow permit movement only in a generally vertical plane.

Placing the robots on the frame rails in opposed configuration as in Pearce would enable symmetrical process of a car body and better processing or coating reach of the car roof as in Yamamoto. Raising the frame as in Nuber and lowering the robot below this frame improves access to the top surface of the substrate, and in the automobile field, would improve coating of the roof of the car. The cross support both Pearce, Nuber and Yamamoto would reduce the possibly of collapse by improving structural support.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized movable robots mounted on fixed elevated frame

rails mounted on fix legs in order to provide better coating reach of the car roof and to have utilized a cross support in order to provide structural support.

As to claim 73 and 77, Takeo discloses that each robot arm is a 6-axis robot with a wrist implement, with the non-wrist component of the arm having 3 axes, including axes for defining a generally vertical planar operating space, and the wrist component being connected to the free end of the arm and the tool, the wrist component having 3 axes (column 6, lines 48-64).

As to claim 79 and 80, Takeo discloses 6 axes of motion, including the four claimed, and the multiple axes of Takeo allow the shoulder axis to be offset as claimed.

As to claim 61, Takeo, as modified by Yamamoto and Pearce and applied to claim 1 above discusses the pair of frame rails mounted on opposite sides and extending generally parallel to the path of movement of the object (Takeo and Pearce), the frame rails being elevated above a plane of an upper surface of the object (see Pearce, Nuber and Yamamoto), the frame rails being connected together in a rigid frame structure (Pearce, Nuber and Yamamoto), at least one robot arm mounted on an associated one of each of said frame rails (Takeo), and that the robot arm is movable along the associated frame rail (Takeo, Nuber and Pearce), and that both frame rails cannot move *relative* to each other, and both frame rails do not move *relative* to said frame (Pearce). Similarly, Nuber discloses that the shoulder and elbow permit movement only in a generally vertical plane from the position of the joints in Figure 3.

Takeo further discloses that each robot arm has at least two axes of motion for movement in a generally vertical plane transverse to the path of movement of the object (see column 6, lines 48-64), and these axes are considered to be shoulder and elbow axes. Takeo also further discloses that the tool is a paint applicator (bell type atomizers 5_f) mounted on each of the at least one robot arms (items 5_1 and 5_2) and the arms move the paint applicators relative to the object while the paint applicators dispense paint to cover the upper surface and side surfaces of the object with paint.

As to claim 81, Yamamoto as incorporated discloses generic control means (see Figures 14A, 14B, and 14C), which are capable of performing the claimed movements. Similarly, Nuber discloses that the shoulder and elbow permit movement only in a generally vertical plane from the position of the joints in Figure 3. Pearce and Nuber suggest raising the frame rails. Additionally, the apparatus of Takeo is capable of performing the functions as claimed.

As to claim 63, the robots of Takeo, Yamamoto and Pearce are capable of moving as claimed.

As to claim 65 and 86, Pearce and Nuber as incorporated discloses that the frame rails are mounted on floor engaging legs (see Pearce, Figure 2, Nuber, Figures 1-3).

As to claim 67 and 87, Pearce discloses that the frame rails are connected by at least one cross support member elevated above the plane of the upper surface of the object.

As to claim 69 and 82, both Pearce and Takeo disclose opposed symmetric robot designs. Takeo as incorporated discloses the capability of symmetric painting.

As to claim 70, 71, 78 and 89, Takeo discloses 6 axes of motion, including the four claimed, and the multiple axes of Takeo allow the shoulder axis to be offset as claimed (column 6, lines 48-64).

Claim 90-95 and 97-101 is rejected based on the same rationale as claims 61, 63, 65, 67, 69-73, 77, 79-82, 86, 87 and 89 above. With respect especially to independent claim 90 and 91, Takeo discloses first and second robot arms, and 6 axes of movement as well as rails on both sides. Yamamoto suggests raising them, and Pearce and Nuber suggest placing them on frames as claimed. See especially the rejection of claims 72, 61, and 81 above for independent claims 90 and 91.

Similarly, with respect to claim 92, Nuber as applied discloses the claimed axes.

As to claim 94, Takeo, Yamamoto and Nuber disclose paint applicators.

As to claim 95, the robots of Takeo, Yamamoto and Nuber as modified can performed the claimed functions.

With respect to claim 98, Takeo discloses the frame rails, and the robot arms, and the paint applicator. Takeo utilizes rotational axis (swinging, pivoting, etc) for the first and second links (see column 6). Yamamoto suggests raising the robots, and Nuber and Pearce suggest fully elevating the robots.

As to claim 99, Pearce and Nuber suggest supporting guide rails on a frame. Additionally, Yamamoto and Takeo both disclose the multiple carriage and link system via the dual opposed robot approach.

As to claim 100, Takeo discloses a 3-axis wrist (column 6, lines 48-64).

As to claim 101, both Takeo and Nuber discloses fifth and six axes of rotation.

3. Claims 74, 83 and 97 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeo, Yamamoto, Nuber and/or Pearce as applied to claims 72, 81 and 91 above, and further in view of Thome (US Patent 5,744,190).

The references as applied above are silent as to the robot arms including a process controller mounted for movement therewith along the associated frame rail.

However, as to claims 72, 83 and 97, Thome discloses that it is known to include process controller (control systems 109a) within the robot bodies. Thome utilizes the process controllers in conjunction with sensors for robot feedback, and one in the art would appreciate that the close proximity of the control device to the sensors reduces the amount of wiring needed between the process control and the sensor. Therefore, it would have been obvious to one of ordinary skill in the art to have utilized such process controls in order to reduce wiring between the robot feedback mechanism and the process control. Furthermore, such a placement would result in the system being mounted for movement along the associated frame rail in the context of the robots used in Takeo (as modified by Yamamoto and Pearce).

4. Claims 75, 88 and 96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeo, Yamamoto, Pearce and Thome as applied to claims 72, 81 and 91 above, and further in view of Cebola (US Patent 5,738,727).

As to claim 75, 88 and 96, Takeo, Yamamoto, Pearce, and Thomes as applied abovedo not disclose that the cross support member is tubular for receiving cables and conduits connecting the process controllers together.

Cebola discloses that it is known to make structural elements hollow or tubular for receiving cables and conduits connecting the process controllers together. Cebola discloses that shielding these cables protects from electrostatic fields and charges (see column 7, lines 37-45). Therefore, it would have been obvious to one of ordinary skill in the art to make cross beams and support elements tubular or hollow for receiving cables and conduits in order to protect the cables and conduits from electrostatic effects and charges.

5. Claim 76 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takeo, Yamamoto, Pearce and Thome as applied to claims 75 and 52 above, and further in view of Neikter (US Patent 5,296,026).

Takeo, Yamamoto, Pearce, and Thome as applied to claim 75 above do not suggest that at least one cross support member is tubular and purged with an inert gas or air for explosion protection.

Neikter discloses that it is known for the cross support (item 20) to have a gas permeable tubular element (item 22) surrounding the cross support for generating a positive pressure (see column 4, lines 12-29). Neikter also discloses that the gas presented to the room can be an inert gas such as argon (see column 5, lines 10-17). One in the art would appreciate that this would protect the robots from explosion and

prevent chemical interactions with the paint material. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized cross supports which spread inert gas in order to protect the robots from explosion and prevent chemical interactions with the paint material.

6. Claims 64 and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeo, Yamamoto and Pearce as applied to claims 61 and 81 above, and further in view of Josefsson (US Patent 5,766,355).

Takeo, Yamamoto, and Pearce as applied to claims 61 and 81 above do not suggest that the frame rails are mounted on walls of a paint booth extending generally parallel to the path of movement. However, Takeo, Yamamoto, and Pearce have been applied to show the frame rails

Josefsson discloses that it is known to have painting robots mounted inside of a paint booth. Josefsson discloses that the use of such a paint booth confines the paint to the chamber, and facilitates collection of the paint overspray (see column 2, lines 40-61). Josefsson discloses that collection of the overspray in a paint booth allows for the later reapplication of the excess paint to subsequent automobiles (see column 3, lines 29- 43), which one in the art would immediately recognize as reducing material costs. Therefore, it would have been obvious to one of oordinary skill in the art at the time of the invention to have utilized a paint booth with walls (as in Josefsson) in conjunction with the frame rail robot design (of Takeo, Yamamoto and Pearce) in order to confine the paint overspray and facilitate paint re-use, thus reducing paint material costs.

7. Claims 66, and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeo, Yamamoto and Pearce as applied to claims 61 and 67 above, and further in view of Cebola (US Patent 5,738,727).

As to claim 66 and 68, Takeo, Yamamoto, and Pearce as applied above does not disclose that either the frame rails are tubular, or the frame rail and cross support member are tubular.

Cebola discloses that it is known to make structural elements hollow or tubular for receiving cables and conduits connecting the process controllers together. Cebola discloses that shielding these cables protects from electrostatic fields and charges (see column 7, lines 37-45). Therefore, it would have been obvious to one of ordinary skill in the art to make cross beams and support elements tubular or hollow for receiving cables and conduits in order to protect the cables and conduits from electrostatic effects and charges.

Cebola as applied above discloses coupling conduits stored with the structural elements (see Figure 4, items 224 and other items).

8. Claims 62, 84 and 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takeo, Yamamoto, Pearce as applied to claims 61 and 81 above, and further in view of Hohn et al (US Patent 4,896,274).

Takeo as applied does disclose a 6-axis robot with three of the axes being in a wrist mounting. Takeo, however, is silent as to the capabilities or movements of the 3-

axis wrist mounting, and one would expect any conventional 3-axis wrist mounting to be used.

Hohn discloses a known 3-axis wrist mounting (item 27), for use in either adhesive application or paint spraying (column 3, line 36) in automobile industries, which is part of a larger, 6-axis robot, similar to that in Takeo. Take discloses two tilting axes (at pivot points 28 and 30), and a *rotating* axis (at point 32, as see column 3, line 65 to column 4, line 16 for discussion of the movements). Hohn recites that these three axes are intended to effect control over the orientation of the tool carried by the manipulator (or robot) with respect to a relocatable point of reference. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have utilized a wrist having a rotating axis and a tilting axis as in Hohn in order to effect control over the orientation of the tool carried by the manipulator (or robot) with respect to a relocatable point of reference.

Response to Arguments

9. Applicant's arguments filed 10/17/2006 have been fully considered but they are not persuasive.

10. A rejection addressing claim 78 has been added.

11. Nuber has been cited to show that shoulder and elbow axes which permit movement only in a generally vertical plane are known.

12. Nuber has also been cited to show that positioning a shoulder axis

13. Applicants arguments are unpersuasive for the reasons shown above and recited in the prior office action.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George R. Koch III whose telephone number is (571) 272-1230 (TDD only). If the applicant cannot make a direct TDD-to-TDD call, the applicant can communicate by calling the Federal Relay Service at 1-800-877-8339 and giving the operator the above TDD number. The examiner can normally be reached on M-F 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christopher Fiorilla can be reached on (571) 272-1187. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

George R. Koch III

Primary Examiner
Art Unit 1734

GRK
6/12/2006